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Professional Experience:

- Engineering consultant – Aurecon Australia
- Current member of NSW Dams Safety Committee (DSC), and Chairman of its Mining Subcommittee
- 42 years professional experience in dam safety management, geotechnical investigations for dams, tailings dam design, hydrogeological assessments for underground coal mines, hydrogeological investigations for coal seam methane projects.

Response:

I thank you for the opportunity to respond to the NSW Dam Safety Review, Community Consultation Paper. Although I am currently a member of the DSC, I stress that the response herein represents my own personal viewpoint, and is not necessarily that of the DSC or my employer, Aurecon Australia. Initially I should state that, as the Dams Safety Act, under which the NSW Dams Safety Committee operates, is now 35 years old, I am of the opinion that a review of the legislation and the operations of the Committee are justified. I will not comment on the KPMG report, as I am aware that the DSC will respond to issues raised by that report, as well as factual errors and inconsistencies contained therein.

NSW Dam Safety Review, Community Consultation Paper appears to be largely concerned with economic considerations as applied to setting dam safety standards. In particular, the Minister's foreword encapsulates this sentiment when it states that "... to ensure that an appropriate level of public safety is achieved and maintained requires careful consideration of the extent to which the current regulatory framework provides an appropriate balance between dam safety risk reduction and the costs of achieving this risk reduction". This seems to be the major driving force for the overall Review of the DSC. While I feel that achieving this balance is a critical issue that requires careful consideration, my main concern is that there are several other vitally important areas of DSC governance that have had very little attention in the Review, and I fear may be ignored or overlooked in the finalisation of the review process. Since the Community Consultation Paper indicates that "there may be issues that you wish to raise that are not covered in the paper", I will leave discussion of the major focus of the Review to others, and I will confine my response, for simplicity, to two important areas that are within my own area of expertise and receive no attention in the Paper:

1. mine dams (including tailings dams) and
2. mining near dams.

Mine Dams

Dams owned by mining companies (including mine water dams and tailings dams) comprise nearly 30% of the prescribed dams in NSW, and the number is rising. Very rarely are these dams designed using risk assessment methodologies. Mining companies are generally risk averse, and use a standards-based approach in the design of most tailings and mine water dams. This is accepted by the DSC, as historically tailings dams worldwide have had a failure rate more than two orders of magnitude higher than the failure rate of conventional water retention dams. The balance between

cost effectiveness and dam safety risk reduction in tailings dam design is therefore relatively unimportant to mining companies. This is because the business risks posed by an unsafe dam are considered untenable by the mining company, as they may threaten the viability of the entire project. In addition, any extra costs required to reach a high level of safety in design are generally negligible in the overall cost of the mine project.

Because of their much higher failure rate, mining dams have merited a more intensive regulation regime than other dams for the following reasons:

- Mining companies rarely employ dam engineers, and staff charged with the operation and monitoring of these dams generally have no dam experience;
- Mining companies often have a rapid turnover of staff, so that it is often the case that mining staff responsible for monitoring dam safety have little knowledge of the operational and safety history of the dam;
- Tailings dams often contain hazardous materials that may harm the environment if released, even in small quantities;
- Tailings dams are often constructed in stages, so that the safety of the dam, and the consequences of failure can change significantly over the life of the dam;
- Tailings Dams are constructed rapidly (generally just ahead of or during mining), often from residual materials from the mining operation itself. While residual materials are significantly cheaper and more readily available than other purposely purchased materials they are not necessarily as suitable;
- Tailings dams often involve sequential upstream raises, which may be vulnerable to liquefaction in some circumstances;
- The overall safety and stability of a tailings dam often depends on the dam being operated correctly in accordance with design requirements, and any deviation from these operating principles could render the dam potentially unsafe and liable to failure; and
- Tailings dams have relatively short lives, and capping and closure of these structures to render them long-term safe can present significant problems.

The Review has made no comment or recommendation on the nature, scope or suitability of the DSC's regulation of mining dams. While I believe that the DSC's current oversight of mining dams is satisfactory, I suggest that this be considered in any final review, so that the ongoing safety status of mining dams is not compromised, and current tailings dam safety levels in NSW are maintained.

Mining near Dams

Although the Community Consultation Paper states that "The *Dams Safety Act 1978* arose from a perceived need for government regulation to ensure that dams in NSW did not pose an unacceptable risk to life and property", this is not entirely factual. The DSC was created under the *Dams Safety Act 1978*, as a consequence of recommendations in the Reynolds Enquiry (1977) which investigated in detail issues relating to the competing demands of mining and the safety of water storages.

This Inquiry set broad guidelines for mining under storages and near large dams, and the DSC initially adopted these guidelines in its deliberations into mining applications near dams. This is largely the reason why the DSC has maintained an interest in mining under large dam storages, since it was

prime reason for the establishment of the DSC in 1978. The KPMG report notes that “the Act is not clear on the separation of the dam structure and the stored waters” and “the DoPI was concerned that the DSC is acting beyond its powers under the Act and the Mining Act”. This is clearly a misconception on the part of the DoPI, as, based on the recommendations of the Reynolds Inquiry, one of the prime tasks intended for the DSC was to monitor and regulate mining under stored waters.

In the case of mining near tailings dams, it should be noted, that the DSC does not concern itself with mining under tailings storages, but limits its interest to regulation of mining near tailings dam structures. This is because the tailings themselves have no value to the community should they be lost into the mine opening (unlike large water storages), and they were clearly not in Commissioner Reynolds mind when making his recommendations. It is also noted here that the DSC currently does not concern itself with the safety of underground miners, where it relates to inrushes (through intervening strata) from overlying water or tailings storages, as this is the considered the responsibility of the departments administering the Coal Mine Health and Safety Act and the Work Health and Safety Act.

The guidelines set out in the Reynolds Inquiry were initially adopted by the DSC, but they are now considered to be obsolete as they are generally overly-conservative. New procedures have been adopted and refined over the intervening years based on actual mining experience, so that mining can now be undertaken safely with minimal risk beneath large storages. This has come about due to several factors including the following:

- There is now a vast amount of experience in mining near large dam structures and under water storages, with no measurable loss of storage or significant damage to dam structures. The evaluation of mining applications is often based on the DSC’s vast catalogue of monitoring data from previous successful mining projects in the region.
- There are now a range of mining techniques and methodologies that can be used to limit the degree of mine subsidence and these are used in the vicinity of dams and storages to minimise mining impacts.
- There are now several new methods and technologies being used to monitor the effects of mine subsidence, so that adverse impacts can be detected at an early stage and any mitigation strategies implemented in a timely manner.
- The advent of risk-based decision-making has led to the development of the DSCs own risk assessment methodology for evaluating mining applications. While this methodology is in the early development stage, it is likely that it will be instrumental in determining the acceptability of future mining applications. To date, no other more appropriate assessment methodologies have been developed by either mining companies or dam owners, but the DSC remains open to the development of improved assessment methods.

The issue of mining near dams is not mentioned in the Discussion Paper and is briefly noted in the KPMG report. I believe this issue is extremely important and requires much greater consideration than it has received in these documents for the following reasons:

- Much of the easily-extracted coal (particularly in the Southern Coalfield) has already been mined, and there will be an increased desire on the part of the mining companies to extract coal from beneath large water storages.
- Coal seam methane could represent a major fuel source in the Sydney Basin in the future, and it could also be extracted from beneath large water storages. This will require a detailed independent assessment of the likelihood of any damage to the dam structures and the impact on water storages.
- The Sydney Catchment Authority has recently called for a ban on all mining in areas immediately surrounding major water storages. Clearly this is an overreaction to the increased level of mining in the Southern Coalfield, and cannot be justified on the evidence available. What is required is a careful assessment of the impacts of mining and an approval process which can balance the value of the stored waters against the value to NSW of the coal resource.

I believe that the DSC in its current form is more than capable of rising to these regulatory challenges, as it has managed over the past 35 years to fulfil its role with no adverse consequences arising. As an independent body with many years of experience in this field, it is the best placed organisation to regulate mining near dams. That is not to say that a review of its current procedures is not required. However, I would like to stress that any review of the DSCs operation should consider carefully its role in adjudicating the important matters outlined above.



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